An ISO 9001 Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

TITLE	Phone: +91 431 2574091/2574046 Fax : +91 431 252 0233 / 0525 Email : kg@bheltry.co.in
THREE LOBE ROOTS BLOWER	

	Reference Number: MM / PCPS / BLOWER	**Enquiry Date: 03.02.2012**	**Due date for submission of quotation: 15.03.2012**
You are requested to quote the Enquiry number date and due date in all your correspondences.			

BHEL/Trichy is looking for ..... Supply of **THREE LOBE ROOTS BLOWER**

BHEL commercial terms & conditions with Price Bid formats and all annexure can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units) Bharath Heavy Electricals Limited) under reference "**MM/ PCPS / BLOWER** "	
Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.	Yours faithfully, For **Bharath Heavy Electricals Limited** K. Ganesan 04/02/12 Manager / Purchase/ PCPS

Specification Number : TPFH56BLO-BECL-01-REV01

DESIGN INPUT DATA

POSITIVE DISPLACEMENT TYPE THREE LOBE ROOTS BLOWER

In this specification, general details of blowers, their parameters, drive requirements are covered with variants. Under "Project related information" specific details related to the project will be given with the Indent.

Vendor eligibility criteria :

A) Vendor should have designed, manufactured and supplied blowers for 5300 Nm^3/hr flow at 1000 mbar pressure & 9500 Nm^3/hr flow at 800 mbar pressure OR higher capacity than above values.

B) The above blowers should have been in trouble free operation continuously for 2 years.

Vendor to submit supportive documents for (A) and (B) above along with offer. Offer should not be submitted if above points (A) and (B) are not fulfilled by the vendor.

1. SCOPE:

1.1.1. Design, manufacture, inspection, testing, painting, packing and supply of positive displacement type three-lobed roots blower along with the following accessories:

a) Common base frame for blower and motor.
b) Suction and discharge silencer
c) Non-return flap.
d) Pressure relief valve.
e) Foundation bolt.
f) Pulleys for both drive and driven side.
g) Pulley belts with safety hood.
h) Vibration isolation pad.
i) Air intake filter with differential pressure switch.
j) Proximity type zero speed switch for blower (One no)
k) Proximity type zero speed switch for pressure relief valve (One no)
l) Controllers for the above two proximity switches housed in a junction box.
m) Vacuum indicator for suction side (One no).
n) Pressure gauge for delivery side (One no)
o) First fill of lubricant.
p) Local hearing temperature gauges (If required in design)
q) Special tools for erection & maintenance.
r) Commissioning spares.
s) Any other requirements needed by supplier.
t) Flexible connections at inlet & outlet of blower.
u) Pressure gauges and other measurement gauges shall be large enough to view the measurement and easily accessible.
v) Expansion joint details (at inlet & outlet of blowers) like size ,specification and vendor details shall be given in the offer itself.
w) In the project related information Inlet &outlet pipe sizes of blowers given by BHEL shall be confirmed by Vendor, if any changes same may be informed to BHEL in the offer itself.
x) Cooling water requirement for the blowers (If required) shall be informed in the offer itself.

1.2. Supply of recommended spares. (Optional)

1.3. Erection and commissioning supervision at site. (Optional)

1.4. **While designing, if the capacity of drive motors are 200 kW and above, they are HT**

motors and in the scope of BHEL. Whereas, if the capacity of drive motors are below 200 kW, they are LT motors and in the scope of blower supplier. Also, vendor to give two separate offers for (1) blowers with LT motors and (2) blowers without motor. HT motor details like, GA drawing, weight and shaft dimensions will be indicated to blower supplier, during engineering stage of the blower. i.e. after ordering the motor, based on the blower inputs indicated (in 1.4.2) below. The motor details like LT / HT, frequency, speed, insulation class etc.., is to be given separately.

1.4.1. Vendor should provide common base frame for Blower and motor. The applicable / maximum frame size, overall dimension / terminal box location / orientation of the motor which can be accommodated in the respective blowers / frame without any price implications to be indicated by the vendors. The following details for motor selection are to be clearly furnished by the vendors in the offer itself.

1.4.2. Speed-Torque characteristic of the blower applicable with full back pressure during start up, Motor shaft power, recommended motor K.W rating (with minimum 15 % reserve over the shaft power), Motor frame size, both blower & motor Pulley details, dimensions, weight, number of belts & type, center to center distance between pulleys, profile of pulley, Dynamic force (both radial & axial) acting on motor shaft, Full load torque of motor, speed of Blower & motor etc.

2. APPLICATION:

The blowers are intended for supplying air for CFBC boiler at the required capacity and pressure as mentioned in Project related information.

3. DESIGN CONSIDERATION:

3.1. The temperature of the blower components should not increase more than 135°C during operation.

3.2. The blower should contain nameplate containing all essential performance data.

3.3. The driving shaft should be sealed with a radial seal ring.

3.4. The contamination level of the intake filter should be read from a maintenance indicator installed at the front side.

3.5. Between valve and blower there are no shut-off valves.
The discharge valve should protect the blower from over load.

3.6. Blower shall be designed suitable to function in a blower room.

3.7. All the flanged joints should be machined and it should be leak tight.

3.8. Blower shall be designed for 24 hours on 365 days operation.

3.9. Should be capable of meeting all requirements as specified in this specification.

3.10. All materials used shall be of tested quality.

3.11. Type of lubrication to be indicated (pressure/splash)

3.12. The noise level should be as minimum as possible.

4. INSPECTION & TESING:

4.1. The blower is to be inspected as per the BHEL approved quality plan at vendor's works.

4.2. One number in each type of blower is to be tested for rated pressure and capacity.

4.3. The blower should be test run at vendor's work as well as at site for a continuous duration of 72Hrs. each.

5. SPARES: Vendor to recommend spares required for 2 years of trouble free operation.

6. DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER

6.1. Point wise confirmation to the Specification. Filled in Annexure – A and C.

6.2. General arrangement of blowers with major dimensional details and with sufficient views for clear understanding of the blower indicating the floor space requirement. Cross-sectional detail of rotor to be shown in GA drawing.

6.3. The drawing showing the supporting arrangement on floor including static & dynamic loading details at each support to be submitted for purchaser's information.
6.4. Approximate weight of the blower.
6.5. Noise spectrum for all blowers.
6.6. Design calculation for
6.6.1. Capacity of the blower.
6.6.2. Selection of drive system (drive motor, coupling and rotor)
6.6.3. No-load and full-load power calculation considering the minimum and maximum operating conditions.
6.7. Typical quality Plan as per BHEL format (format enclosed) including material, fabrication, assembly, bought out items, no-load test, etc.
6.8. Document submission schedule.
6.9. Filled in data sheets as per Annexure-A.
6.10. Experience list of vendor relevant for the application intended and capacity of the blower supplied shall be submitted.
6.11. List of start up / commissioning spares.
6.12. List of recommended spares.
6.13. Schedule of deviations.
6.14. Checklist.
6.15. Typical O&M manual.
6.16. Data required for motor selection :

a) GD^2 value of Blower,
b) Moment of Inertia of Blower,
c) Absorbed Power at Blower Shaft,
d) Speed Vs Torque Characteristic Curve,
e) Dynamic force acting on motor shaft,
f) Recommended kW rating of Motor.

All documents submitted under this heading should be submitted in 2 sets unless otherwise noted.

7. DOCUMENTS TO BE FURNISHED AFTER AWARD OF CONTRACT:

7.1. Detailed dimensional general arrangement drawing of the total system with cross sectional details, bill of materials and weight of individual parts for purchaser's approval.
7.2. Torque requirement of blower and selection of drive rating.
7.3. The drawing showing the supporting arrangement on floor including static & dynamic loading details at each support to be submitted for purchaser's approval.
7.4 Sound spectrum of individual blower.
7.5 Cumulative Sound spectrum of all blowers.
7.6 Heat dissipated by individual blower.
7.7. Specifications for bought out items.
7.8. Erection & commissioning procedures indicating the sequence, dos and don'ts and checklist.
7.9. Operation & Maintenance manual.
7.9.1. Number of copies required is 2 hard copies in addition to 0 & M in CD.
7.9.2. Manual (Hard copy) should be in printed form only.
7.9.3. The size of manuals should be in correct A4 size with drawings in A3/ A4 size.
7.9.4. Drawings shall be of printed or laser printed only.
7.9.5. Spiral or comb bound copies shall be totally avoided.
7.9.6. O & M manuals shall be submitted to BHEL Trichy, prior to dispatch of equipment.
7.10. Manuals generally should contain the following as minimum.

7.10.1. Datasheet.
7.10.2. Important instructions (dos and don'ts).
7.10.3. System description.
7.10.4. Installation and storage.
7.10.5. Operation.
7.10.6. List of illustrations.
7.10.7. Maintenance (including lubrication, where necessary) and service
7.10.8. Recommended spares.
7.10.9. Trouble shooting procedure.
7.7.10. Assembly drawings with part list, bill of materials, dimensional drawings and other applicable details.
7.7.11. Recommended lubrication schedule & scheme.
7.7.12. Short term and long term storage instruction manual.
7.8. Manuals should pertain only to the types or model supplied for the Particular contract.
7.9. Packing / shipping list as per BHEL format.
7.10. Quality Plan for purchaser's approval.
7.11. Packing/shipping arrangement drawing for review.
All documents submitted under this heading should be submitted in CD unless noted otherwise.

8. PAINTING:

Painting shall be as per vendor standard and the same shall be indicated in the offer.

9. PACKING / SHIPPING:

All components of the blower should be packed in such a way that it should not get damaged during transport.

10. GUARANTEE:

Performance (rated flow, head at design point) and power consumption at MCR, noise level at any 1m from the blower shall be guaranteed by the vendor.

11. EXCLUSION & DEVIATIONS:

Supplier has to indicate clearly the exclusions and deviations in the offer stage itself with specific reasons. Deviation / exclusion will not be entertained after the award of contract.

12. GENERAL:

All drawings shall be prepared using AutoCAD 2010 and submitted in Compact Disk. O & M manual shall be prepared and using Microsoft WORD and submitted in Compact Disk. Running Serial Number shall be given for each of the documents submitted and it should be indexed with a cover sheet.

The extent of scope stated in Section 1 of this specification is not necessarily exhaustive and it shall not relieve the vendor from his responsibility to provide goods and services necessary to satisfy the performance criteria and guarantee specified.

13. OFFER:

Offer is to be submitted for the following:
Offer 1: Blowers without motor
Offer 2: Blowers with LT motors.HT motors are not in blower supplier scope.
Note: 200KW & above are of HT motor. Below 200KW it is LT motor.

Annexure-A

To be filled and submitted by the vendor along with the offer

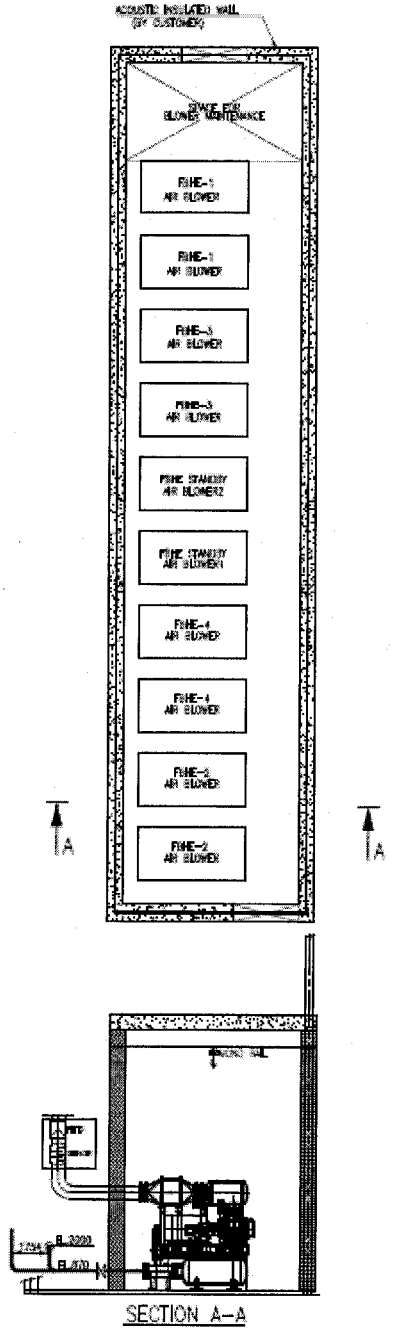
Design data

No	DESCRIPTION		Unit	VAR 01	VAR 02	VAR 03	VAR 04
1.	Name			SEAL & PURGE AIR Blowers	Ash Cooler Blowers	SEAL POT Blowers	FBHE Blowers
2.	Medium to be handled						
3.	Volume per blower		Nm^3/hr				
4.	Differential Pressure	Normal	mbar				
		Maximum	mbar				
5.	Pressure at Inlet		mbar				
6.	Pressure at Outlet		mbar				
7.	Temp. at inlet	Normal	°C				
		Maximum					
8.	Temp. at outlet approx.		°C				
9.	Quantity		No.				
10.	Speed		rpm				
11.	Noise Level		dB(A)				
12.	Heat Load		In kW inside the blower room				
13.	Inlet Pipe Size		mm				
14.	Outlet Pipe Size		mm				
15.	Motor Rating		kW				
16.	Power consumption		kW				
17.	Cumulative noise level of all the blowers running at the same time						

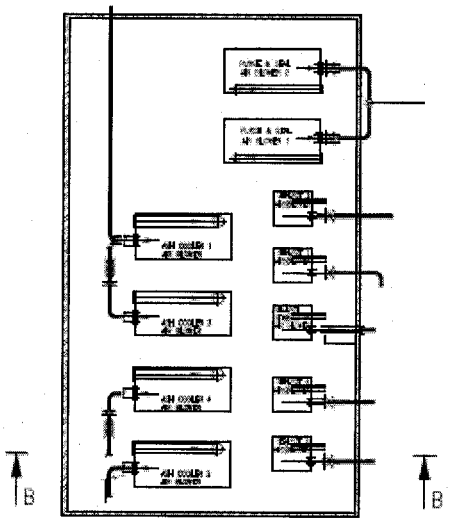
ANNEXURE-B

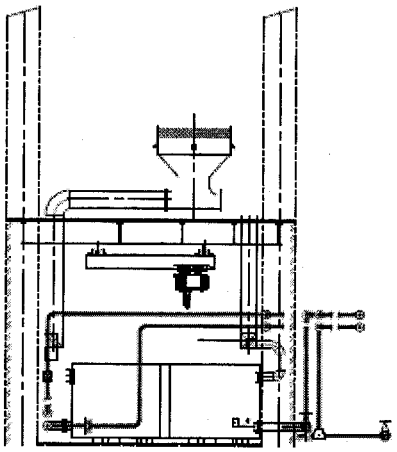
(To the specification no. TPFH56BLO-BECL_01-REV00) Sheet 01 of 01

TYP ARRANGEMENT OF BLOWERS IN ACCOUSTICALLY INSULATED ROOM.



SECTION A-A





SECTION B-B

Specification Number : TPFH56BLO-BECL-01-REV01

ANNEXURE-C

To be filled and submitted by the vendor along with the offer

CHECKLIST

The following documents should be checked and signed by the authorized signatory. Offers not containing any of the documents will be liable for rejection without any further intimation. Vendor in his judgment may add further information, if required.

S.NO	DESCRIPTION	STATUS
1.	Point wise confirmation on the specification	
2.	General arrangement of blower with major dimensional details	
3.	The drawing showing the supporting arrangement	
4.	Approximate weight of the blower	
5.	Design calculation	
6.	Selection of drive system	
7.	Capacity of the blower calculation	
8.	No load and full load power calculation	
9.	Typical quality plan as per BHEL format	
10.	Document submission schedule	
11.	Filled in data sheets as per Annexure-B	
12.	Experience list of vendor	
13.	Typical erection and commissioning procedure	
14.	List of start up / commissioning spares	
15.	List of recommended spares	
16.	Typical O& M manual	
17.	Schedule of deviations	
18.	Checklist in the form of Annexure-C	
19.	Two sets of above documents	

Signature of authorized signatory with office seal.

Design Parameters- Project related information

SL No	DESCRIPTION	Unit	VAR 01	VAR 02	VAR 03	VAR 04
1.	Name		PURGE AND SEAL AIR BLOWER	ASH COOLER BLOWER	SEAL POT BLOWER	FBHE BLOWER
2.	Medium to be handled		Atmospheric Air			
3.	Volume per blower Max	Nm^3/h	5300	9000	2700	9500
	MCR	Nm^3/h	5300	9000	2700	9500
4.	Total head developed Max	mbar	1000	600	600	800
	MCR	mbar	800	477	415	576
5.	Suction pressure Max	mbar	1008	1008	1008	1008
	MCR	mbar	1008	1008	1008	1008
6.	Discharge pressure Max	mbar	2008	1608	1608	1808
	MCR	mbar	1808	1485	1423	1584
7.	Temperature of medium Max	°C	50	50	50	50
	MCR	°C	43.5	43.5	43.5	43.5
8.	Inlet pipe size(ODxt)	mm	355.6X6.4	508X6.4	273X6.35	508X6.4
9.	Discharge pipe size(ODxt)	mm	355.6X6.4	457X6.4	273X6.35	660X6.4
10.	Quantity	No.	2	4	5	10

POWER CONSUMPTION IS TO BE GUARANTEED AT M.C.R.

THE INLET &OUTLET PIPE SIZES MENTIONED HAVE BEEN SELECTED BY BHEL AND VENDOR TO CONFIRM THE SAME,IF ANY CHANGE IN THE PIPE SIZES SHALL BE INFORMED IN THE OFFER ITSELF BY VENDOR.

ANNEXURE – EC&I (SPECIFICATION FOR BLOWER)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG:CI:5316:BLR
Rev:00
SH.NO 1 of 2

A. CONTROL AND INSTRUMENTATION

1. Vendor should provided one no. Proximity type zero speed switch to detect the blower not running and **limit** switch for safety valve position for process interlock purpose. The controllers/Barriers for the above shall be 24V DC rating and rail mounted with 1NO+1NC potential free contact output. The controller should be housed in a junction box and Terminal Block (TB) to be provided in the junction box (JB) for terminating input/output external cables with required double compression nickel plated cable glands.
2. The make of the proximity switch shall be TRUCK/P&F/E&H
3. Vendor should provide one no pressure gauge in suction side and one no. pressure gauge in the delivery side
4. Vendor should provide one no DP switch with alarm contact & trip contact (2 separate contacts) across suction filter
5. Vendor should submit
   a. **Documents along with offer**
      (i) Technical leaflet for proximity switch, barrier/controller, pressure gauge DP Switches
      (ii) PID of the system offered indicating draft gauges, DP switch, safety relief valve proximity sensor, temperature sensor etc.

ANNEXURE – ECI (SPECIFICATION FOR BLOWER)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG:CI:5308:BLR
Rev:00

SH.NO 2 of 2

b. Documents required after placement of order

(i) PID of the system.

(ii) HOOKUP circuit diagram/wiring diagram indicating safety relief valve proximity sensors, zero speed sensor, controller/amplifier up to terminal box (Junction Box)

Motors for blower are not in the blower vendor's scope.

B. Blower supplier has to confirm/provide the following along with offer:

1. Speed-Torque characteristic of the blower indicating back pressure during start up, Motor shaft power, recommended motor **K.W** rating, absorbed power, both blower & Motor pulley details, dimensions, weight, no of belts & type, center to center distance between pulleys, profile of pulley, Dynamic force (both radial & axial) acting on shaft, Full load torque of motor, Blower/motor speed., direction of rotation of blower & motor
2. Frame size of the motor will be indicated to blower supplier after ordering the motor, during engg of the blower, based on inputs indicated (1) above.
3. Blower supplier should provide common base frame for blower & motor to suit the selected motor frame size, Dimensions, terminal box location/orientation with out any price.

	Name	Signature	Date
Prepared	Balaji		27.05.11
Checked	P.Venkataraman		27.05.11
Approved	A.Swaminathan		27.05.11

BHARAT HEAVY ELECTRICALS LIMITED

FBC&HRSG/PURCHASE

Ref: MM/FBC&HRSG/Webtender

SPECIAL CONDITIONS

1. This tender is for the supply as per the enclosed Enquiry and Specification.

2. The vendor shall have adequate experience in manufacturing of this item.

3. The tender is in TWO parts. One part consisting of Technical Bid with Commercial terms & conditions along with Quality plan for the supply in-line with our requirements and another part containing Price Bid. Techno-Commercial bid and Price Bids are to be submitted in separate sealed covers. In addition to technical and commercial conditions, vendors who are not registered vendors of BHEL, Trichy have to submit the filled in "Supplier Registration Forms" (available in www.bhel.com website) along with the technical bid. Based on this and other conditions, as well as capacity and capability and approval by customer vendor will be shortlisted. Both these covers are to be put in a single cover duly super scribing the Enquiry Number. The technical bid with commercial terms & conditions will be opened on the due date and based on the acceptance of techno-commercial bid and vendor evaluation, the price bid of the qualified vendors will be opened on a suitable date with due intimation.

   Following will be the criteria for short-listing the vendors

   - Evaluation of dully filled Supplier Registration Forms.
   - Availability of minimum manufacturing, handling, testing and measuring facilities as detailed in the Supplier Registration Form.
   - BHEL will have the right for spot assessment of the facilities.
   - Meeting our techno-commercial requirements of the enquiry.
   - Customer approval for the vendors before ordering.
   - Accepting & entering in to Integrity Pact (IP).

4. BHEL reserves the right to Negotiate with the L1 vendor.

5. BHEL reserves the right to re-float the tender opened, if L1 price is not the lowest applicable price to them inter-alia other reasons.

6. The materials are to be despached to BECL site Gujarat state with normal packing, in case of indigenous vendors and the materials are to be despatched to **CFR/Chennai** port basis, in case

of Import vendors. Price comparison and ranking of vendors will be done based on landed cost, in Indian rupees

7. For the delayed delivery, LD is applicable at 0.5% per week, subject to a max. of 15% on undelivered portion.

8. Indigenous vendors shall quote for FOR/site (BECL/Bhavnagar, Gujarat).

9. Foreign vendors shall quote for CFR/Chennai basis.

10. Offers will be finalized on package basis and Total cost to BHEL basis only.

11. Performance Bank Guarantee for 10% value of the order shall be submitted, valid for 24 months from the date of dispatch or 18 months from the date of commission.

12. Applicable commercial terms & conditions shall be clearly spelt out in the offer.

08/08/11

Manager/Purchase/FBC&HRSG